

## **REMARKS**

Claims 9-14, 26-36, and 39-42 stand rejected in the Office Action. New claims 43-46 are offered with this Amendment. Upon entry of the Amendments, claims 9-14, 26-36, and 39-46 remain pending.

Support for the newly offered claims is found in the specification as filed, for example, in paragraph 18 on page 6. Applicants respectfully request entry of the Amendments.

## **PERSONAL INTERVIEW WITH EXAMINER BARR**

Applicant would like to thank the Examiner for the courtesies extended to Applicant's representative in a personal Interview on April 27, 2004. The rejections were discussed in view of the cited art. No agreement was reached, but the Examiner indicated his willingness to consider further argument along with any supporting data or argumentation that Applicant could provide. Applicant would also like to thank the Examiner for clarifying his position on the state of the art in relation to the current invention.

## **REJECTION UNDER 35 U.S.C. § 103**

Claims 9-14, 26-33, and 42 stand rejected as obvious over the DiChiara reference in view of the Kourtides reference. Claims 34-36 and 39-41 are rejected as obvious over the DiChiara reference in view of the Kourtides reference and further in view of the Baker reference. The Examiner maintains the rejections for the same reasons as given in previous Office Actions. Briefly, the Examiner takes the position that the DiChiara reference discloses the slurries and method of the current invention except for the presence of a boron compound. The Examiner states that the DiChiara reference suggests that emissivity agents including molybdenum disilicide can be added to the slurry. The Examiner then cites the Kourtides reference for the

proposition that some boron compounds such as silicon hexaboride and silicon tetraboride are known as emissivity agents. Finally, the Examiner cites the Baker reference for the proposition that boron carbide and similar compounds are known emissivity agents. The Examiner then concludes that the invention would have been obvious a person of skill in the art because the references would motivate a person of skill in the art to substitute a boron containing emissivity agents for the molybdenum silicide emissivity agents recommended in the DiChiara reference. For the reasons discussed below and in a previous Office Action replies, and in view of the information presented in the accompanying Declaration by the inventor Mr. DiChiara, Applicant respectfully traverses the rejections as applied to the amended claims and requests reconsideration.

A novel invention is non-obvious and therefore patentable unless the prior art teachings are such that the invention as a whole would have been obvious to one of skill in the art at the time the Application was filed. The invention as a whole includes limitations recited in the claims and described in the specification, as well as properties or advantages inherent in the invention. Importantly, it is noted that method claims may be non-obvious and therefore patentable even if one or more steps of the claims recite the use of known or obvious compositions. That is, the invention as a whole inquiry includes not only the compositions used but the methods used and the results achieved.

The invention as a whole, as reflected in the current claims, is drawn to methods of using novel slurries for increasing the temperature stability of tiles to which the slurries have been applied. Note that claim 9 recites a method for protecting a surface of and increasing the temperature stability of a porous ceramic body, while claim 26 recites a limitation that the surface protected body can be reheated to 2500°F without cracking. The invention as a whole,

includes these advantages which are recited in the claims. In considering the effect of the cited prior art references, it is appropriate to inquire whether the references would have made the invention as a whole—including the increased temperature stability limitation—obvious to a person of skill in the art.

Thus, patentability turns on whether a person of skill in the art, without reading the current specification but relying only on the state of the art reflected in the cited references, would know that slurries containing boron compounds, silica sol, and ceramic material such as cordierite could be used in a method to improve the temperature stability of tiles into which the slurries are impregnated according to the methods of the invention. Since the claims are drawn to methods for using the slurries, patentability does not turn on the non-obviousness of the slurries themselves.

Attention is respectfully directed to the attached Declaration of the inventor, Mr. DiChiara. At paragraph 4, Mr. DiChiara describes the state of knowledge in the art of emissivity agents and how they are used. He points out that the actions of emissivity agents is physical in nature. That is, they function by re-radiating absorbed heat energy, without any necessary chemical interaction with the tile. As further developed in paragraph 5, he compares the typical effect of the emissivity agents to the apparent chemical affect that the boron containing slurries of his invention have. He concludes based on his analysis that a person of skill in the art would not have expected emissivity agents necessarily to improve temperature stability of the tiles. Since this improved stability is part of the invention as a whole, such invention would not have been obvious to the person of skill.

Further in paragraph 12, he gives reasons why, based on his specification he would expect boron compounds generally to work in the slurries of the invention. As developed in his

paragraph 8-11, he explains that boron is a known component of ceramic tile (although of course application of boron in slurries is new). In particular, boron is known to lower the melting point of silica to keep the silica from devitrifying in ceramic applications. As an advance of his previous work in the DiChiara reference, he took the inventive step that the silica sol/cordierite slurry could be used in an improved method if it further contained boron compounds. He now theorizes that the boron of his current slurries overcomes a deficiency in the top layer of ceramic tiles into which the silica sol slurries are incorporated. He explains that by using methods of the current invention where boron is introduced into the silica sol/cordierite mixture, the ratio of boron to silica is restored, preventing the surface coating from deteriorating at high temperature (see paragraph 11).

On the basis of the above comments in Mr. DiChiara's Declaration, and for the reasons discussed in previous Office Action replies, Applicant respectfully submits that the invention as a whole, including the limitation that the method results in tiles of improved temperature stability, would not have been obvious to a person of skill in the art at the time of the invention.

Mr. DiChiara also addresses the issue of whether all boron compounds would be effective in the slurries of his invention, or whether the invention is limited only to the boron compound disclosed in the working Example of the specification, i.e. boron carbide. On the basis of his analysis, he concludes that all boron compounds would be effective in his slurries, with the proviso or caveat given in paragraph 18 of the specification (see paragraph 13).

Specifically, Mr. DiChiara points out that under the high temperature environment of the tiles in use, boron compounds in the slurry are converted to oxide in the pores of the ceramic body. He further theorizes that the oxides are the active agent. Because all of the boron

compounds turn into the active ingredient upon exposure to high temperatures in the application, he concludes that many if not all boron compounds would work in the slurries of his invention.

Applicant believes that he has provided persuasive evidence that the invention as a whole would not have been obvious to a person of skill in the art in light of the cited references. The invention as a whole includes the recited limitation that the tile protected by the slurries using the methods of the invention are stable to higher temperatures than they would be if treated by slurries not containing the boron compounds. Accordingly, Applicant respectfully requests that the rejection be withdrawn.

#### **NEW CLAIMS 43-46**

Claims 43-46 are offered to further define the invention. They are patentable for the reasons discussed above, and because they are neither taught or suggested by the cited references.

#### **CONCLUSION**

For the reasons discussed above, Applicants believe that the claims as amended are patentable and respectfully request an early notice of allowance. The Examiner is invited to telephone the undersigned Applicants representatives if that would be helpful to resolving any issue.

Respectfully submitted,

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